No. 629,007. Patented July 18, 1899.

F. J. W. FISCHER.

METALLIC PEN.

(Application filed May 3, 1899.)

(No Model.)

Fig. 1.

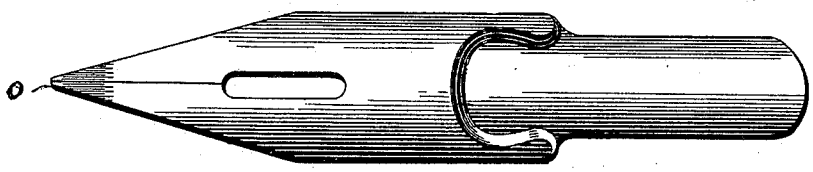


Fig. 2.

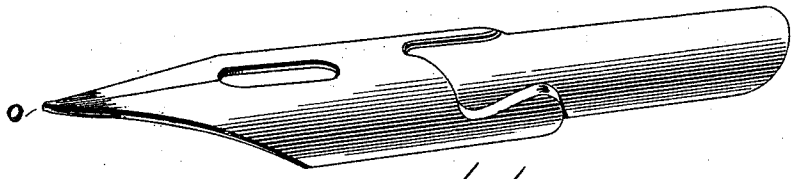


Fig. 3.

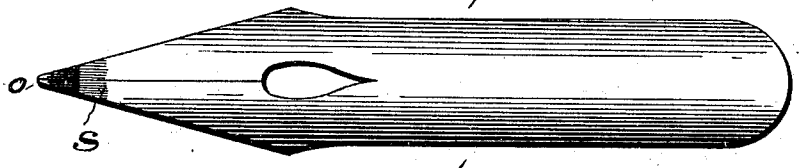
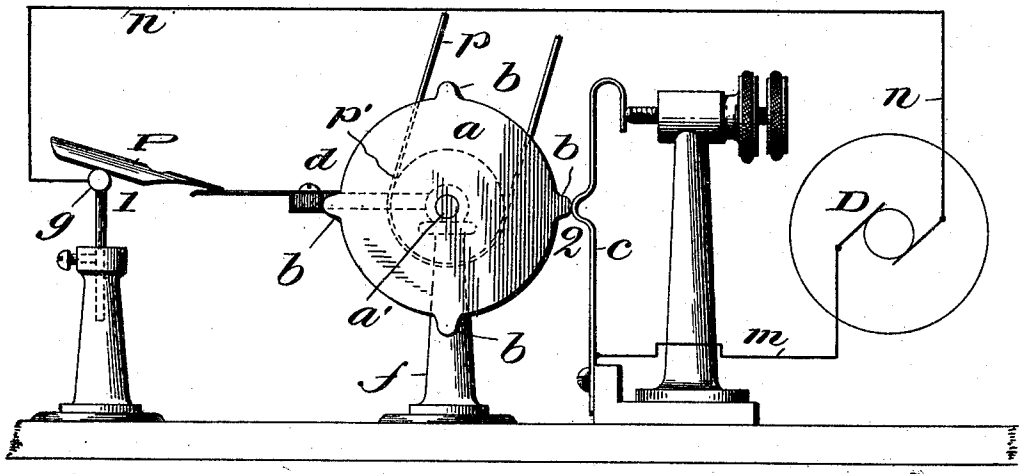


Fig. 4.



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FREDERICK J. W. FISCHER, OF NEW YORK, N. Y., ASSIGNOR TO THE EAGLE PENCIL COMPANY, OF SAME PLACE.

METALLIC PEN.

SPECIFICATION forming part of Letters Patent No. 629,007, dated July 18, 1899.

Application filed May 3, 1899. Serial No. 715,435. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK J. W. FISCHER, a citizen of the United States, and a resident of the city of New York, in the county and State of New York, have invented a new and useful Improvement in Metallic Pens, of which the following is a specification.

This invention has relation to metallic pens, and more particularly to steel pens or pens having a steel point; and it consists of a pen of this kind in which the extreme point is hardened or as it is termed in the art "glass-hard," while the remainder of the pen or the nibs of the pen, upon which the pen depends for its elacticity in writing, remain unhardened or tempered and elastic.

In the manufacture of steel pens as usually conducted the pen after being shaped is hardened—that is to say, it is heated to a red heat and is then suddenly plunged into a bath of oil. The effect of this operation is to render the pen extremely hard, "glass-hard," as it is termed, or so hard as to resist a file; but it is also rendered exceedingly brittle, so brittle, in fact, that it can be readily broken into bits by pressure between the fingers. The next operation, therefore, is to put it through a tempering process, which while imparting to the pen the requisite elasticity necessarily reduces its hardness, the result being that the pen in use will soon wear out. What I propose to do is to restore to the very extreme point of the pen the glass-hard condition which is lost when undergoing the tempering operation, at the same time leaving the remainder of the pen unaffected and in the condition to which it was brought by the tempering operation.

By the "extreme point" of the pen I mean a length of, say, from one thirty-second to one sixty-fourth of an inch at the very point of the pen. The hardening of the metal destroys its elasticity and makes it extremely brittle, and to harden much more of the thin metal of which the point of the pen is composed would be not only to destroy the elasticity of the pen, but to put it in such condition that the nibs would snap off under the pressure to which they are subjected when in use for writing or marking purposes. Such a pen would be unfit for use and would be valueless commercially or for any other purpose.

The hardening of the extreme point of the pen is effected by heat. I have, however, found it impracticable to effect this result by the mechanical application of heat—as, for example, by subjecting the point of the pen to the action of a flame or a blowpipe or a bath of molten metal or other mechanical heating appliances. In the first place it is not possible to confine the glass-hard end to the extreme point of the pen, and, secondly, that portion of the pen immediately back of the hardened point will lose its temper and be annealed and softened, thus rendering the pen useless for all practical purposes. I have found that through the agency of electricity I can produce a pen having a glass-hard end localized and confined to the extreme writing-point of the pen, leaving the other portion of the pen back of that point unimpaired in temper and elasticity. The manner in which I attain this result will be now described by reference to the accompanying drawings, in which—

Figure 1 is a view of a steel pen embodying my invention. Fig. 2 is a view of a like pen having a slightly-turned-up point. Fig. 3 is a view of a composite metallic pen embodying my invention—that is to say, a main portion of which is made of brass, aluminium or other bronze, or other suitable metal which will not rust or corrode easily—with a front portion or tip made of steel, the extreme point of which is glass-hard in accordance with my invention. Fig. 4 is a side elevation, partly diagrammatic, of an apparatus adapted to effectuate my invention.

The apparatus shown in Fig. 4 comprises an electric circuit, which includes a dynamo or other suitable source of electrical supply (typified at D) and is interrupted or broken at two points 1 and 2. At 1 it is completed through the pen P. At 2 it is made and broken at different intervals by an automatic circuit maker and breaker, which consists of a revolving disk a, mounted in a suitable stand a' and driven at a comparatively slow rate of speed from a suitable prime mover by a belt and pulley $p\ p'$ or other suitable intermediary, said disk having at intervals apart on its periphery

contact-points *b*, which as the disk revolves are successively brought into and out of electrical contact with the adjustable spring contact-strip *c*. This strip is electrically connected with one pole of the dynamo through wire *m*, and the contact-points *b* on disk *a* are electrically connected to plate *d* of conducting material, which in this instance is formed as a spring-yielding strip attached to a support *f*. The opposite pole of the dynamo is electrically connected through a wire *n* with a rest *g*, made of conducting material and placed opposite to and at an intenral from the plate *d*. It is this internal that is bridged by the pen P, the attendant taking the pen and placing it so that while its body will bear on the rest *g* its point will bear on the contact-plate *d*. By suitable means—as, for example, by a variable resistance interposed in the electrical circuit in any well-known way—the electrical current passing over the circuit can be adjusted so that when the circuit is closed it will bring the point of the pen (which rests on contact-plate D) to a red heat. It will be understood that the pen before being thus heated is completed in all other respects.

Assuming the dynamo to be in operation and the disk *a* to be in continuous revolution, the operation is as follows: The circuit is closed momentarily at 2 each time one of the points *b* on the disk *a* meets the contact-strip *c*. At a time when the circuit is broken at 2 the attendant takes up a pen to be treated and with it bridges the interval between the rest *g* and the contact-plate *d*, the body of the pen resting on and being in electrical contact with the rest *g* and the point of the pen resting on and being in electrical contact with the contact-plate *d*, thus closing the circuit at 1, while it is still interrupted at 2. Then when the circuit is completed at 2 by one of the contact-points *b* meeting the strip *c* the circuit will be completed. The closing of the circuit at 2, though momentary, is sufficient to raise the extreme point of the pen to a red heat, (owing to the electrical resistance at that point,) while as the circuit thus momentarily completed is broken by the continued revolution of the disk *a* the heat disappears, the pen-point at once cools and becomes glass-hard, and the attendant, throwing aside the pen which is finished, picks up a new one and places it in position before the circuit can be again completed at 2. If the circuit were interrupted only at point 1, then each time the interval were bridged at the point 1 there would be a spark at the extreme point of the pen between it and the plate *d*, which would have the effect of destroying the metal of the pen at that point and unfitting the pen for use. It is to avoid this that the circuit is intermittently made and broken at 2, so that the pen can be applied to close the circuit at 1 in the interval or break of the contact at 2. The pen as it appears after this treatment is shown in Fig. 1. The nibs of the pen are slightly discolored for some little distance back of the extreme point, as indicated by the shade-lines; but this discoloration is superficial and can be removed, if desired, although I prefer to let it remain. Notwithstanding this superficial discoloration the temper of the nibs back of the extreme point remains unimpaired. It is only the extreme point *o* that has been made glass-hard.

The object of making the contact-plate *d* spring-yielding is that when the pen-point is pressed upon it it (the plate) may yield to the pressure sufficiently to prevent the nibs from turning up at the end under the action of the heat generated at the point of contact by the passage of the electric current. The pen thus will retain its original shape at the point and will remain a straight-pointed pen, as seen in Fig. 1. In case, however, it be desired to give a slight upturn to the extreme point of the pen, as is preferred sometimes, this can be readily accomplished by and during the operation of hardening the point. For this purpose the contact-plate *d* will be a stiff and unyielding support, so that when the point of the pen is pressed down upon it the nibs will spread slightly apart at the end. Under these conditions when the point is heated by the passage of the electric current the nibs will yield and turn upward slightly at the extreme point, and the finished pen will then be as shown in Fig. 2. The attendant after a few trials can readily regulate the pressure so as to insure the proper upturn to the pen-point.

Fig. 3 shows a pen which has a hardened-steel point, as shown in Fig. 1, the body of the pen being of brass or other metal which will not rust or easily corrode. The line of junction of the steel and brass is indicated at *s*, the two being "sweated" together or united in other known or suitable ways. I desire to be understood as including any such modification in my claim.

Having described my invention and the best way now known to me of carrying the same into effect, what I here claim as new and of my own invention is—

As a new manufacture, a metallic pen having a "glass-hard" point and a tempered body back of that point as set forth.

In testimony whereof I have hereunto set my hand this 27th day of April, 1899.

FREDERICK J. W. FISCHER.

Witnesses:

SAMUEL KRAUS,

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